

BK117 C-1

APPROVED ROTORCRAFT FLIGHT MANUAL



Valid for Model: MBB-BK117 C-1 and MBB-BK117 C-1D

Registration Mark: _____

Serial No.: _____

Year of Manufacture: _____

IT IS THE OPERATOR'S RESPONSIBILITY TO MAINTAIN THIS MANUAL IN A CURRENT STATUS IN ACCORDANCE WITH THE LIST OF EFFECTIVE PAGES.

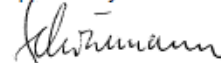
This manual is part of the above designated helicopter. It includes the material to be furnished to the pilot as required by FAR Part 29.

The "Airworthiness Limitations" section of the Rotorcraft Maintenance Manual shall be complied with.

THIS MANUAL MUST BE CARRIED IN THE HELICOPTER AT ALL TIMES.

Original Issue - October 02, 1992

Approved by:

Luftfahrt-Bundesamt
Braunschweig

Published by:

EUROCOPTER DEUTSCHLAND GmbH

LOG OF REVISIONS

FIRST ISSUE

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REVISION 31 (see entry below)

REVISION 31

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Date: NOV 26, 2015

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SECTION 4

NORMAL PROCEDURES

4.1 GENERAL

This Section contains instructions and recommended procedures which are peculiar to the operation of this helicopter.

For definition of terms, abbreviations and symbols used in this Section refer to Section 1.

4.2 PREPARATION FOR FLIGHT

4.2.1 Flight Restrictions

The minimum, normal, maximum and cautionary operation ranges for the helicopter and its subsystems are indicated by instrument markings, placards and decals.

For helicopter and subsystem restrictions refer to Section 2, Limitations.

NOTE Before helicopter operation with a passenger on copilot's seat, cyclic stick and collective pitch lever on copilot's side should be removed, copilot's pedals adjusted to the most forward position and the dual control covers (see FMS 10-16) installed.

If the covers are not available, cyclic and collective levers shall remain installed. However, in this case, the passenger must be briefed properly before starting engines not to interfere with any pilot's control operation.

4.2.2 Flight Planning

Refer to Sections 5 and 9 to determine required fuel, airspeeds and power settings for takeoff, climb, cruise, hovering and landing data necessary to accomplish the mission.

NOTE Before flight it is necessary to check that the fuel grade is selected properly relative to fuel temperature/altitude limitations given in section 2.

4.2.3 Mass and Balance

The takeoff and anticipated landing gross mass and balance should be obtained before takeoff and checked against mass and load limits and center of gravity restrictions (see Section 2).

4.3 PREFLIGHT CHECK

4.3.1 General

The preflight check shall be accomplished, according to either the Flight Manual, the Maintenance Manual or the Pilot's Checklist.

The preflight check is not a detailed mechanical inspection, but essentially a visual check of the helicopter for correct condition.

This check shall be completed before each flight. However, items not marked with a star (★) need only be checked before the first flight of the day.

When unusual local conditions dictate, the extent and/or frequency of this check shall be increased as necessary to promote safe operation.

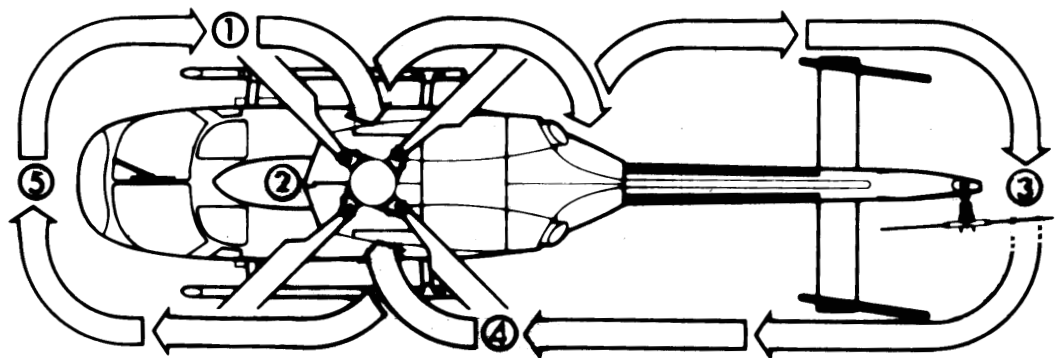
NOTE • The following list contains only check items for the standard configuration.

- In addition to these items, check antennas and all installed optional equipment.
- Make certain that all relevant intermediate and special inspections in accordance with the Maintenance Manual have been complied with.
- For optional equipment check items, refer to the respective Flight Manual Supplement or Maintenance Manual, Chapter 800.

4.3.2 Exterior Check

The exterior check is laid out as a walk-around check, starting forward right at the pilot's door, proceeding clockwise to the tail boom, to the left hand side (including the upper and lower areas of the helicopter) and is completed at the helicopter nose area.

- NOTE**
- If possible, the helicopter should be headed into wind before starting the engines.
 - The area around the helicopter should be clear of all foreign objects.
 - To avoid excessive drain on the helicopter battery, particularly during cold weather, all ground operations should be conducted using an external power unit (EPU).
 - When the battery is used, the operation of electrical equipment should be kept to a minimum.



- | | |
|--------------|--------------|
| 1. Fuselage | - Right side |
| 2. Cabin | - Top |
| 3. Tail boom | - Aft area |
| 4. Fuselage | - Left side |
| 5. Cabin | - Front |

Fig. 4-1 Exterior Check Sequence

Before exterior check

- | | |
|----------------------------------|----------------------------|
| ★ Helicopter forms and documents | - Check, complete |
| Fuel tanks | - Drain |
| Fuselage underside | - Condition, no fuel leaks |
| ★ Covers and tie-downs | - Removed |
| ★ Ice and snow (if any) | - Removed |
| ★ Ground handling wheels | - Removed |

- ★ To be checked **before each flight**

EFFECTIVITY *Helicopter S/N 7007***Cockpit**Center Control Panel

All switches and avionics
except:

- OFF

FUEL VALVE I + II

- OP, guarded

Collective pitch

All switches

- OFF or in neutral position

Overhead panel:

All circuit breakers

- In

All switches

- OFF

Power levers

- OFF

Instrument panel:

Both FIRE EXT/FUEL SOV switches

- NORM

AGENT DISCH switch

- OFF

FIRE DET TEST switch

- NORM

All switches and avionics

- OFF

Center control panel:

MASTER PWR switch

- NORM

Voltmeter indication

- Minimum 24 V DC

PWR SELECT switch

- BAT

BUS-TIE switch

- NORM

Pitot tube heating (PITOT HTR)

- Function

Static port heating (STATIC HTR)

- Function

Lighting:

Position lights

- Function

Anti-collision light

- Function

Strobe lights

- Function

Landing lights

- Function

Before night flights:

Instrument lights

- Function

Utility light

- Function

Dome light

- Function

Hand lamp

- Function

Center control panel:

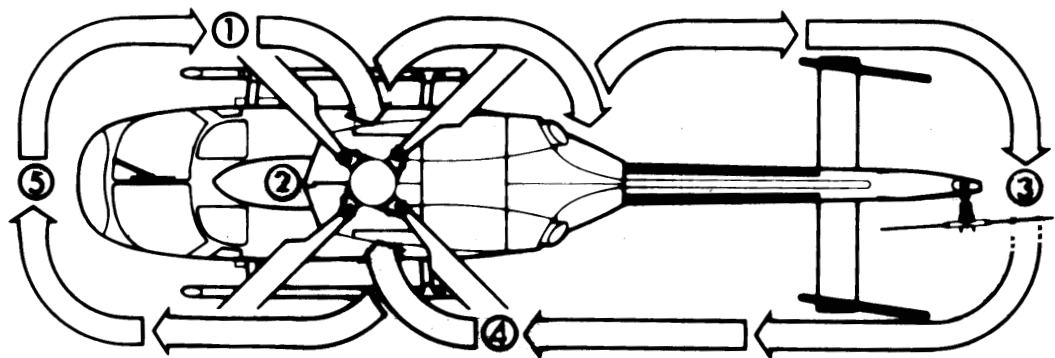
MASTER PWR switch

- OFF

4.3.2 Exterior Check

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- | | |
|--------------|--------------|
| 1. Fuselage | - Right side |
| 2. Cabin | - Top |
| 3. Tail boom | - Aft area |
| 4. Fuselage | - Left side |
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Fig. 4-1 Exterior Check Sequence

Before exterior check

- | | |
|----------------------------------|----------------------------|
| ★ Helicopter forms and documents | - Check, complete |
| Fuel tanks | - Drain |
| Fuselage underside | - Condition, no fuel leaks |
| ★ Covers and tie-downs | - Removed |
| ★ Ice and snow (if any) | - Removed |
| ★ Ground handling wheels | - Removed |

- ★ To be checked **before each flight**

■ **EFFECTIVITY** *Not for Helicopter S/N 7007*

Cockpit

Center Control Panel

All switches and avionics - OFF

Collective pitch

All switches - OFF or in neutral position

Overhead panel:

All circuit breakers - In

All switches - OFF

Power levers - OFF

Instrument panel:

Both FIRE EXT/FUEL SOV switches - NORM

AGENT DISCH switch - OFF

FIRE DET TEST switch - NORM

All switches and avionics - OFF

Center control panel:

PWR SELECT switch - BAT

Voltmeter indication - Minimum 24 V DC

BUS-TIE switches (2) - ON

Pitot tube heating (PITOT HTR) - Function

Static port heating (STATIC HTR) - Function

Lighting:

Position lights - Function

Anti-collision light - Function

Strobe lights - Function

Landing lights - Function

Before night flights:

Instrument lights - Function

Utility light - Function

Dome light - Function

Hand lamp - Function

Center control panel:

PWR SELECT switch - OFF

Fuselage - right side

Cockpit air intake	- Clear
Lower cockpit window	- Condition
★ Pedal area	- No foreign objects
Circuit breakers, fwd junction box (if installed)	- Check in
★ Pitot tube	- Clear, condition
Drain port	- Clear
★ Static ports (2)	- Clear
Cockpit door	- Condition, function
Pilot seat and safety belt	- Condition
Cabin door	- Condition, function

EFFECTIVITY *Jettisonable sliding door installed, after ASB-BK117-20A-114*

Stretch seal strips on exterior and interior jettisoning handles	- Condition
--	-------------

EFFECTIVITY *All*
Cabin top

Cockpit overhead window	- Condition
Hydraulic compartment	- No leakage, no foreign objects
Hydraulic system	- Condition
Hydraulic system filter clogging indicator pins (4)	- Check in
★ Hydraulic system fluid reservoirs (2)	- Oil level
Hydraulic system outboard fittings (4)	- Secured
Rotor brake oil reservoir	- Oil level, filler cap secured
★ Hydraulic compartment cowling	- Closed, secured
★ Oil cooler air inlet screen (2)	- Clear
★ Transmission oil	- Oil level
Swash plate and boot	- Condition
★ Main rotor head	- Oil level, condition
Blade attachment bolts, driving link assembly and rotor hub cap	- Condition, secured

(continued)

- ★ To be checked **before each flight**

Fuselage - right side (continued)

- | | |
|---|---|
| ★ Rotating control rods | - Condition, free movement |
| Rotating control rod spherical bearings | - Check for smooth operation by moving control rods by hand |
| Vibration absorbers | - Condition, free movement, no leakage |
| Rotor blades and trim tabs | - Condition, turn rotor by hand in direction of rotor rotation and check for free run |
| ★ Maintenance steps | - Check in |
| Landing gear and step | - Condition |
| Vents and drainports | - Clear |
| ★ Transmission compartment | - No leakage, no foreign objects |
| Oil cooler inlet duct | - Clear |
| Transmission oil cooler block plate | - Installed, if OAT below -35°C (recommended to be removed if OAT above +35°C) |
| ★ Engine oil tank | - Oil level |
| Engine oil tank | - Condition, no leakage, security of mounting, filler cap closed and secured |
| Transmission | - Condition |
| Transmission struts | - Condition, secured |
| Transmission oil filter clogging indicator pin | - Check in |
| Transmission oil filler cap | - Secured, locked |
| Mixing lever assembly | - Condition, secured |
| Rotor brake system | - Condition |
| ★ Engine air inlet screen | - Clear, secured |
| Scavenge oil filter clogging indicator pin (if installed) | - Check in |

(continued)

- ★ To be checked **before each flight**

Fuselage - right side (continued)

- ★ Transmission access door - Closed, secured
- Engine compartment - No leakage, no foreign objects
- Engine - Condition
- Engine oil ducts - No leakage
- Wiring, linkages and lines - Condition, no leakage, no chafing
- Hoses of engine water washing system (if installed) - Security
- Engine exhaust pipe - Condition, secured
- Rear bearing oil ducts - No leakage
- Engine mounts - Condition, secured
- Fire detectors (3) - Condition
- ★ Engine access door - Closed, secured
- ★ Maintenance step - Closed, secured
- Battery (if located here) - Condition, no electrolyte spillage, security of mounting
- Battery door - Closed, secured
- Aft engine cowling - Secured
- ★ Fuselage - right side - Condition
- Clam shell doors - Condition, function
- First aid kit - On board
- Baggage compartment - Condition
- Small baggage compartment - Condition
- ★ Clam shell doors - Closed, secured

★ To be checked **before each flight**

Tail boom

- ★ Tail boom - right side - Condition
- ★ RH horizontal and vertical stabilizer, position light - Condition
- Vertical fin and cowling - Condition, secured
- Position light and anti-collision light - Condition
- Tail skid - Condition
- ★ Tail rotor gear box - Oil level, no leakage, filler cap secured

NOTE Verification of oil level may be easier when tail skid is shaken briefly.

- Tail rotor head, shaft, bellow - Condition
- ★ Pitch links - Condition
- Blade attachment bolts, balance masses, dynamic masses - Condition, secured
- Sliding sleeve - Check free movement
- ★ Tail rotor blades - Condition
- Vertical fin and cowling - Condition, secured
- ★ Intermediate gear box - Oil level, no leakage
- NOTE** Verification of oil level may be easier when tail skid is shaken briefly.
- Intermediate gear box - Filler cap and drain screw secured
- ★ Vertical fin access door - Closed, secured
- ★ LH horizontal and vertical stabilizer, position light - Condition
- ★ Tail boom - left side - Condition
- Flux valve cover - Condition

- ★ To be checked **before each flight**

Fuselage - left side

- | | |
|---|--|
| ★ Red bursting plate for fire extinguisher system | - Check undamaged |
| Fire extinguisher bottles | - Check for correct pressure indications (2) according to the Pressure–Temperature table |
|
NOTE Engine must be cold for Pressure-Temperature table to be valid. | |
| Aft engine cowling | - Secured |
| Bleed air heater screens (2) | - Clear |
| Engine compartment | - No leakage, no foreign objects |
| Engine | - Condition |
| Engine oil ducts | - No leakage |
| Wiring, linkages and lines | - Condition, no leakage, no chafing |
| Hoses of engine water washing system (if installed) | - Security |
| Engine exhaust pipe | - Condition, secured |
| Rear bearing oil ducts | - No leakage |
| Engine mounts | - Condition, secured |
| Fire detectors (3) | - Condition |
| ★ Engine access door | - Closed, secured |
| ★ Transmission compartment | - No leakage, no foreign objects |
| Oil cooler inlet duct | - Clear |
| Transmission oil cooler block plate | - Installed, if OAT below -35°C (recommended to be removed if OAT above +35°C) |
| ★ Engine oil tank | - Oil level |
| Engine oil tank | - Condition, no leakage, security of mounting, filler cap closed and secured |
| Transmission | - Condition |
| Transmission struts | - Condition, secured |

(continued)

- ★ To be checked **before each flight**

Fuselage - left side (continued)

Transmission oil filter clogging indicator pin	- Check in
Mixing lever assembly	- Condition, secured
Rotor brake system	- Condition
★ Engine air inlet screen	- Clear, secured
Scavenge oil filter clogging indicator pin (if installed)	- Check in
★ Transmission access door	- Closed, secured
★ Maintenance step	- Closed, secured
Landing gear and step	- Condition
★ Fuel filler cap	- Secured, locked
Vents and drainports	- Clear
★ Fuselage - left side	- Condition
Cabin door	- Condition, function

EFFECTIVITY *Jettisonable sliding door installed, after ASB-BK117-20A-114*

Stretch seal strips on exterior and interior jettisoning handles	- Condition
--	-------------

EFFECTIVITY *All*

Cockpit door	- Condition, function
Cyclic stick	- Secured, safety-wired
Copilot seat and safety belts	- Condition
★ For single pilot flights: Copilot's safety belts	- Fastened, secured
★ Static ports (2)	- Clear
Drain port	- Clear
★ Pitot tube	- Clear, condition
★ Pedal area	- No foreign objects
Lower cockpit window	- Condition
Cockpit air intake	- Clear
★ To be checked before each flight	

Nose area

Cockpit windshields	- Condition, clean
Windshield wipers	- Condition
OAT-bulb	- Condition
N ₁ temperature sensor	- Condition
Battery	- Condition, no electrolyte spillage, security of mounting
Battery connectors (2)	- Connected
Avionic equipment	- Condition
★ Battery/avionics access door	- Closed, secured
Circuit breaker for EPU	- Check in
★ EPU access door	- Closed, secured
Battery vents	- Clear
Landing light	- condition, retracted
★ Fuselage bottom	- Condition

Miscellaneous

★ Baggage, cargo, loose items	- Stowed, secured
Hand-fire extinguisher	- On board, check pressure
Hand lamp	- On board
★ Passengers	- Briefed

★ To be checked **before each flight**

EFFECTIVITY *Helicopter S/N 7007***4.3.3 ★ Interior Check**

- | | |
|------------------------|------------------|
| Seat and pedals | - Adjust |
| Safety belts | - Fasten, adjust |
| Shoulder harness locks | - Function |

- | | |
|-----------------------------------|-----------|
| All switches and avionics except: | - OFF |
| - PWR SELECT switch | - BAT |
| - STATIC PRESS switch | - PRIMARY |
| - GEN TRIP switch | - NORM |
| - DG switch | - SLAVE |

Collective pitch (pilot / copilot)

- | | |
|--------------|---------------------------|
| All switches | - OFF or neutral position |
|--------------|---------------------------|

Instrument panel

- | | |
|----------------------------|---------------------------|
| FIRE EXT/FUEL SOV switches | - NORM |
| AGENT DISCH switch | - OFF |
| FIRE DET TEST switch | - NORM |
| All switches and avionics | - OFF or neutral position |
| Clock | - Set |

Overhead panel

- | | |
|----------------------|---------|
| All switches | - OFF |
| All circuit breakers | - In |
| Power levers | - OFF |
| HYD TEST switch | - NORM |
| OAT | - Check |

★ To be checked **before each flight**

Nose area

Cockpit windshields	- Condition, clean
Windshield wipers	- Condition
OAT-bulb	- Condition
N ₁ temperature sensor	- Condition
Battery	- Condition, no electrolyte spillage, security of mounting
Battery connectors (2)	- Connected
Avionic equipment	- Condition
★ Battery/avionics access door	- Closed, secured
Circuit breaker for EPU	- Check in
★ EPU access door	- Closed, secured
Battery vents	- Clear
Landing light	- condition, retracted
★ Fuselage bottom	- Condition

Miscellaneous

★ Baggage, cargo, loose items	- Stowed, secured
Hand-fire extinguisher	- On board, check pressure
Hand lamp	- On board
★ Passengers	- Briefed

★ To be checked **before each flight**

■ **EFFECTIVITY** *Not for Helicopter S/N 7007*

4.3.3 ★ **Interior Check**

- | | |
|------------------------|------------------|
| Seat and pedals | - Adjust |
| Safety belts | - Fasten, adjust |
| Shoulder harness locks | - Function |

- | | |
|-----------------------------------|-----------|
| All switches and avionics except: | - OFF |
| - STATIC PRESS switch | - PRIMARY |
| - GEN TRIP switch | - NORM |
| - DG switch | - SLAVE |

Collective pitch (pilot / copilot)

- | | |
|--------------|---------------------------|
| All switches | - OFF or neutral position |
|--------------|---------------------------|

Instrument panel

- | | |
|----------------------------|---------------------------|
| FIRE EXT/FUEL SOV switches | - NORM |
| AGENT DISCH switch | - OFF |
| FIRE DET TEST switch | - NORM |
| All switches and avionics | - OFF or neutral position |
| Clock | - Set |

Overhead panel

- | | |
|----------------------|---------|
| All switches | - OFF |
| All circuit breakers | - In |
| Power levers | - OFF |
| HYD TEST switch | - NORM |
| OAT | - Check |

★ To be checked **before each flight**

EFFECTIVITY Helicopter S/N 7007

★ **Pre-start check**

Voltmeter indication	- Minimum 24 V DC
EMER LTS switch	- ARM
EMER LTS switch	- ON - check emergency exit lights come on
EMER LTS switch	- ARM
PWR SELECT switch:	
- for battery start	- Leave in BAT
- for EPU start	- EXT PWR (EPU caution light must illuminate)
BUS-TIE switch	- NORM
DOM LIGHT pushbutton	- ON
BUS-TIE switch	- OFF, check cockpit domlight off
BUS-TIE switch	- NORM
DOM LIGHT pushbutton	- Off, or as required
FUEL PUMP PRIME switches	- ON (check PRIME PUMPS caution light comes on, FUEL PRESSlights off)
FUEL PUMP PRIME switches	- OFF
FUEL PUMP XFER switches	- ON, (F PUMP XFER caution light off)
FUEL PUMP XFER switches	- OFF, (F PUMP XFER caution light on)
FIRE DET TEST switch	- Test-check lights come on
Instruments	- Check
- Mast moment indicator	- TEST
- FUEL QTY indicator	- Check quantity
- OVSP F caution lights	- Check on
- BOTH N ₁ indicators	- Check bleed valve lights on

(continued)

★ To be checked **before each flight**

Pre-start check (continued)

N_1 indicator test buttons

- Press in turn; check that analogue needles point to 2.5 minutes limit (+1.3%) and digital indications meet the value shown on the N_1 tachometer check table ($\pm 0.2\%$) for given pressure altitude and OAT
- After 3 seconds, check that digital indication reads 188.8
- After another second, check that analogue and digital N_1 indications return to zero

NOTE • If incorrect values are indicated during the test and the aircraft has been exposed to the sun for an extended period, repeat the test after engine start prior to takeoff.

- If the OAT sensor circuit is interrupted, the indication "LH" will be shown on the digital display; the code "LL" indicates a short circuit.

MASTER warning light

- Reset

Instruments

- Check

ANN PNL TEST switch

- Push to test annunciator panel lights and check PITOT HEATER 1 and 2 caution lights on the instrument panel, if installed

AMM SEL switch

- GEN II

CHIP DET TEST switch
(spring-loaded)

- Chip 1 (forewarned chip detectors) – both ENG 1 CHIP and ENG 2 CHIP caution lights must come on.

CHIP DET TEST switch

- Chip 2 (aft chip detectors) – both ENG 1 CHIP and ENG 2 CHIP caution lights must come on.

Power levers

- Check free movement through full travel including emergency range (removable stop-pins, if installed, must be pulled), then power levers OFF (stop pins, if installed, inserted).

Trim actuator limit switches
(only if DAFCS not installed)

- Check (check full travel of stick)

Flight controls

- Check free movement through full travel

Collective pitch

- Lock

Rotor brake lever

- Check fully down (to check ROTOR BRAKE caution light, pull the lever slightly and check fully down again)

Cyclic stick position

- Centered

EFFECTIVITY Not for Helicopter S/N 7007

★ **Pre-start check**

PWR SELECT switch	- BAT
Voltmeter indication	- Minimum 24 V DC
EMER LTS switch	- ARM
PWR SELECT switch	- OFF - check emergency exit lights come on
PWR SELECT switch	- BAT
EMER LTS switch	- ON - check emergency exit lights come on
EMER LTS switch	- ARM
PWR SELECT switch:	
- for battery start	- Leave in BAT
- for EPU start	- EXT PWR (EPU caution light must illuminate)
BUS-TIE switches (2)	- ON
GENERATOR switches	- ON
FUEL PUMP XFER switches	- ON, (F PUMP XFER caution light off)
FUEL PUMP XFER switches	- OFF, (F PUMP XFER caution light on)
PRIME PUMPS caution light	- Check function in turn:
FUEL PUMP PRIME I (II) sw	- ON - check PRIME PUMPS caution lights comes on
FUEL PUMP PRIME I (II) sw	- OFF
Both FUEL PUMP PRIME switches	- ON - check FUEL PRESS lights off
NOTE Minimum operation time of prime pumps before engine start is 10 seconds.	
FIRE DET TEST switch	- Test - check lights come on
Mast moment indicator	- TEST
FUEL QTY indicator	- Check quantity
OVSP F caution lights	- Check on
Both N ₁ indicators	- Check bleed valve lights on

(continued)

★ To be checked **before each flight**

Pre-start check (continued)

N₁ indicator test buttons

- Press in turn; check that analogue needles point to 2.5 minutes limit (+1.3%) and digital indications meet the value shown on the N₁ tachometer check table ($\pm 0.2\%$) for given pressure altitude and OAT
- After 3 seconds, check that digital indication reads 188.8
- After another second, check that analogue and digital N₁ indications return to zero

NOTE • If incorrect values are indicated during the test and the aircraft has been exposed to the sun for an extended period, repeat the test after engine start prior to takeoff.

- If the OAT sensor circuit is interrupted, the indication "LH" will be shown on the digital display; the code "LL" indicates a short circuit.

MASTER warning light

- Reset

Instruments

- Check

ANN PNL TEST switch

- Push to test annunciator panel lights and check PITOT HEATER 1 and 2 caution lights on the instrument panel, if installed

AMM SEL switch

- GEN II

CHIP DET TEST switch (spring-loaded)

- Chip 1 (forewarned chip detectors) – both ENG 1 CHIP and ENG 2 CHIP caution lights must come on.

CHIP DET TEST switch

- Chip 2 (aft chip detectors) – both ENG 1 CHIP and ENG 2 CHIP caution lights must come on.

CHIP DET TEST switch (spring-loaded)

- CHIP 1 (forewarned chip detectors) – both ENG 1 CHIP and ENG 2 CHIP caution lights must come on.

Power levers

- Check free movement through full travel including emergency range (removable stop-pins, if installed, must be pulled), then power levers OFF (stop pins, if installed, inserted).

Trim actuator limit switches (only if DAFCS not installed)

- Check (check full travel of stick)

Flight controls

- Check free movement through full travel

Collective pitch

- Lock

Rotor brake lever

- Check fully down (to check ROTOR BRAKE caution light, pull the lever slightly and check fully down again)

Cyclic stick position

- Centered

4.4 STARTING ENGINES

4.4.1 Before starting engines

Fire guard (if available)	- Posted
Rotor area	- Clear
Anti-collision light	- ON

4.4.2 Starting first engine

CAUTION IMMEDIATELY ABORT START AND, IF INDICATED, PERFORM MAINTENANCE ACTION BEFORE RESTART FOR ANY OF THE FOLLOWING:

- TOT RISES ABOVE LIMITS
(If start is aborted but TOT limits are not exceeded, wait 15 seconds after N_1 RPM has returned to zero before attempting restart. This permits excess fuel to drain from combustion chamber.)
- NO POSITIVE ENGINE OR TRANSMISSION OIL PRESSURE INDICATIONS UPON REACHING GROUND IDLE CONDITION - MAINTENANCE ACTION!
- N_2 RPM AND ROTOR RPM NEEDLES ARE NOT MATCHED AFTER REACHING STABILIZED GROUND IDLE CONDITION - MAINTENANCE ACTION!
- SUSPECTED BLADE STRIKE INTO VERTICAL STABILIZERS.
Blade strike should be suspected if unusual noise or bang was audible during runup. Under gusty or turbulent wind conditions, especially with vertical wind components, and low rotor rpm (below 25%) main rotor blade(s) may strike the vertical stabilizer(s) - MAINTENANCE ACTION!
- OVSP F CAUTION LIGHT DOES NOT GO OFF AT 25% N_2 ON FIRST ENGINE START, OR AT 45% N_1 ON SECOND ENGINE START, RESPECTIVELY.

ABORT START PROCEDURE (Engine ventilation)

CAUTION DO NOT PERFORM ENGINE VENTILATION WITH FUEL VALVE CLOSED

Power lever	- OFF
Starter button	- Depress (observe engine starter limitations)

(continued)

Starting first engine (continued)

- NOTE**
- Either engine may be started first.
 - If, for any reason a starting attempt is discontinued, the entire starting sequence must be repeated from the beginning.

- CAUTION**
- DO NOT EXCEED STARTER DUTY CYCLE.
 - MONITOR CLOSELY TOT (STARTING TRANSIENT BETWEEN 785°C AND 865°C FOR MAXIMUM 5 SECONDS).
 - DURING THE NEXT STEPS, IT IS IMPORTANT TO HOLD THE POWER LEVER TRIGGER DEPRESSED BECAUSE IT MAY BE NECESSARY TO MOVE THE LEVER BEHIND THE IDLE STOP (TO AVOID EXCEEDING THE TOT LIMITS).

NOTE Engine starting procedure should normally be completed within 20-60 seconds

- | | |
|---------------------------------|--|
| 1. Power lever | - Preselect 20° (hot engine approx. 18°) |
| 2. Starter button | - Depress and hold. Simultaneously depress and hold the power lever trigger; Start clock. |
| 3. TOT | - Monitor. As soon as TOT exceeds 400°C, vary power lever position to maintain TOT at approximately 700°C. |
| 4. N_2/N_{RO} increase | - Monitor |
| 5. Starter button | - Release at $N_1 = 40\%$ |
| 6. OVSP F caution light | - Check off at $N_2 > 25\%$ |
| 7. Power lever | - Increase to IDLE ($70\% \pm 2\% N_1$) |
| 8. Engine and XMSN oil pressure | - Check positive indication |

- NOTE**
- During start, the engine oil pressure may exceed 5 bar.
 - Avoid prolonging operation in the range between 50% and 65% N_1 .

- | | |
|-----------------|------------|
| 9. Cyclic stick | - Centered |
|-----------------|------------|

4.4.3 Starting second engine

NOTE During start of second engine the OVSP F caution light indication will go off at $N_1 > 45\%$

EFFECTIVITY *If 27 Ah battery is installed*

- | | |
|------------|---|
| 9. Ammeter | - Operating generator, check below 100 A (battery start only) |
|------------|---|

EFFECTIVITY *All*

NOTE If the start of the first engine was aborted and successfully repeated, verify that the generator current is below 100 A before attempting to start the second engine (battery start only).

10. Repeat items 1 to 7 of this procedure (on previous page)

11. Following an EPU-assisted start:

- | | |
|---------------------------|----------------|
| - PWR SELECT switch | - BAT |
| - BUS-TIE switches (2) | - Check ON |
| - GEN I and GEN II lights | - Check OFF |
| - EPU | - Disconnected |
| - EPU light | - Check OFF |

12. FUEL PUMP XFER switches (2) - ON

13. FUEL PUMP PRIME switches (2) - OFF
check PRIME PUMPS caution light off.

EFFECTIVITY *After SB-BK117-90-117*

- | | |
|---------------------------------|--|
| 14. PITOT HTR P and CP switches | - ON
check PITOT HEATER 1 and 2 caution lights off. |
|---------------------------------|--|

EFFECTIVITY *All*

NOTE After start, do not advance engines to flight idle until the minimum oil temperature has been reached.

4.4.4 Cold weather starts

- NOTE**
- When starting at low ambient temperature, oil pressure may exceed 5 bar.
 - At temperatures below -30°C it is generally recommended to preheat the battery to -20°C or above.
 - During engine start at low ambient temperature the mast moment indicator and the triple tachometer pointer movements may be sluggish. After warmup the indications are correct.
 - After abrupt temperature changes from cold to warm (parking the helicopter in a heated hangar at low ambient temperatures) a complete loss of the lubricant at the main rotor pendulum absorbers may occur.

Depending on ambient temperature, two different cold weather starting procedures are presented subsequently.

To perform cold weather starts, proceed generally in accordance with the normal engine starting procedure described in paragraphs 4.4.2 and 4.4.3 above. However, replace steps 1 to 4 of that procedure by the appropriate (entire) sequence shown below.

Outside air temperature between -30°C and -40°C :

1. Power lever - Preselect 30° position

CAUTION DURING THE NEXT STEPS, IT IS IMPORTANT TO HOLD THE POWER LEVER TRIGGER DEPRESSED BECAUSE IT MAY BE NECESSARY TO MOVE THE LEVER BEHIND THE IDLE STOP (TO AVOID EXCEEDING THE TOT LIMITS).

2. Starter button - Depress and hold. Simultaneously depress and hold the power lever trigger. Start clock.
3. TOT - Monitor. As soon as TOT increases, vary power lever position to maintain TOT at approximately 700°C .
4. N_2/N_{RO} increase - Monitor
5. Starter button - Release at $N_1 = 50\%$

CAUTION AFTER START, DO NOT ADVANCE ENGINES TO FLIGHT IDLE UNTIL THE MINIMUM OIL TEMPERATURE HAS BEEN REACHED.

Outside air temperature below -40°C :

1. Power lever - Preselect FLIGHT position

CAUTION DURING THE NEXT STEPS, IT IS IMPORTANT TO HOLD THE POWER LEVER TRIGGER DEPRESSED BECAUSE IT MAY BE NECESSARY TO MOVE THE LEVER BEHIND THE IDLE STOP (TO AVOID EXCEEDING THE TOT LIMITS).

2. Starter button - Depress and hold. Simultaneously depress and hold the power lever trigger. If necessary, move power lever slowly forward. Start clock.
3. TOT - Monitor. As soon as TOT increases, vary power lever position to maintain TOT at approximately 700°C .
4. N_2/N_{RO} increase - Monitor
5. Starter button - Release at $N_1 = 50\%$

CAUTION AFTER START, DO NOT ADVANCE ENGINES TO FLIGHT IDLE UNTIL THE MINIMUM OIL TEMPERATURE HAS BEEN REACHED.

4.5 SYSTEM CHECKS

4.5.1 ★ Hydraulic system check

- NOTE**
- These checks may be performed between starting first and second engine at the pilot's discretion.
 - Before operating the HYD TEST switch in cold weather conditions, some cyclic control inputs are necessary to guarantee a perfect switch-over to system 2.

WARNING DO NOT TAKE OFF WITH A FAULTY HYDRAULIC SYSTEM.

- CAUTION**
- OBSERVE MAST MOMENT LIMITS DURING CHECK.
 - IF, AFTER CROSSOVER FROM SYSTEM 1 TO SYSTEM 2, A RUNAWAY OF CYCLIC STICK OR COLLECTIVE PITCH OCCURS (INCREASED CONTROL FORCES IN THE LONGITUDINAL-, LATERAL-, OR COLLECTIVE AXES), RESELECT SYSTEM 1 IMMEDIATELY AND SHUT DOWN THE ENGINES.

Check the hydraulic systems (1 + 2) by small cyclic stick inputs in all four directions and slight up and down movements of the collective pitch lever.

Power lever(s) of started engine(s)	- Check IDLE
Hydraulic pressure indications	- Check in the green range
Hydraulic system 1	- Check
HYD TEST switch	- Crossover to system 2 - MASTER and HYD 1 → 2 lights must come on.
Hydraulic system 2	- Check
Hydraulic pressure indications	- Check in the green range
HYD TEST switch	- Reselect to system 1 - MASTER and HYD 1 → 2 lights must go off.

★ To be checked **before each flight**

4.5.2★YAW CSAS system check

NOTE Perform CSAS system checks **before each flight**, after the hydraulic system checks. If the 3-axis CSAS is installed, refer to FMS 10-32. If the DAFCS is installed, refer to FMS 10-48.

Circuit breakers CSAS YAW (2) and INV (1 or 2, as installed)	- Check in - CSAS YAW caution and YAW OFF segment lights are on.
INVERTER switch (1 or 2, as installed)	- ON
YAW sequence switch	- Press - CSAS YAW caution and YAW OFF segment lights go off; YAW STBY segment light comes on.
YAW sequence switch	- Press again - YAW STBY segment light goes off.
YAW TEST switch	- TEST position - <u>all</u> YAW CSAS caution and segment lights must come on.
YAW TEST switch	- OFF (check detent lock) - <u>all</u> YAW CSAS caution and segment lights go off.
Pilot's STABILIZATION CUTOFF pushbutton	- Press - <u>all</u> YAW CSAS caution and segment lights come on.
YAW sequence switch	- Press twice to reengage YAW CSAS - <u>all</u> YAW CSAS caution and segment lights go off.

- NOTE**
- Perform the last two above steps again using copilot's STABILIZATION CUTOFF pushbutton switch.
 - The helicopter should not be operated with the YAW CSAS switched OFF, since STANDBY and ON modes provide tail rotor drive shaft protection against hard or abrupt pedal inputs.

★ To be checked **before each flight**

EFFECTIVITY *Helicopter S/N 7007***4.5.3 ★SPAS system check**

- | | |
|--|--|
| Circuit breakers SPAS (2) and INV (1 or 2, as installed) | - Check in |
| INVERTER switch (1 or 2, as installed) | - ON |
| SPAS toggle switch | - ON, then TEST and release. |
| SPAS caution light | - Check for illumination <u>after</u> approximately 4 seconds. |
- If caution light fails to illuminate or if illumination occurs immediately after initiation of test procedure:
- | | |
|--------------------|---|
| SPAS toggle switch | - OFF/RESET - continue with SPAS switched OFF and note that V_{NE} is reduced by 15 kt. |
|--------------------|---|
- If test result positive:
- | | |
|--------------------|---|
| SPAS toggle switch | - OFF/RESET, then ON - check SPAS caution light extinguished. |
|--------------------|---|

4.5.4 ★Avionic checks

- | | |
|-------------------------------------|-----------------|
| COMM/NAV equipment | - ON and check |
| All other instruments and equipment | - Check and set |

4.5.5 ★Miscellaneous checks

- | | |
|-----------------------------|-------------------|
| Optional equipment switches | - Set as required |
|-----------------------------|-------------------|

4.5.6 Power check

Perform power check as required (see Section 5)

4.5.7 Bleed air heating check

- | | |
|-------------------|---|
| HTR SELECT switch | - BOTH |
| HTR switch | - ON - check if ENG 1 / ENG 2 HEAT control lights come on and TOT rises simultaneously. |

EFFECTIVITY *Helicopter S/N 7007***4.5.8 Engine overspeed trip system check**

CAUTION THE OVERSPEED TEST SWITCH SHALL ONLY BE OPERATED, WHEN THE POWER LEVER OF THE ENGINE TO BE CHECKED IS IN OR NEAR THE IDLE POSITION.

Power lever

- of engine to be checked - IDLE
- of other engine - Move smoothly to FLY position

N₂ speed of engine to be checked - Check at 90 %

NOTE If N₂ (engine to be checked) deviates from the 90% mark, adjust N₂ of respective engine with power lever to achieve 90%, in order to meet the overspeed test trip speed.

OVERSPEED TEST switch - Select engine at IDLE (engine to be checked); N₂ speed must decrease

OVERSPEED TEST switch - OFF (middle position); N₂ speed must increase to previous value

Repeat procedure for second engine (first move power lever of idling engine smoothly up to FLY position, and then reduce the other to IDLE position).

NOTE If there is no significant engine response (N₂-drop) upon operation of the OVERSPEED TEST switch repeat the check with slightly higher/lower N₂ ($\pm 1\%$) settings.

If there is still no significant engine response an overspeed trip system malfunction must be assumed.

4.5.9 VARTOMS – Variable rotorspeed and torque matching system

CAUTION IF ANY ABNORMAL FUNCTION OF THIS SYSTEM IS SUSPECTED, SELECT THE "MAN" MODE AND PROCEED IN ACCORDANCE WITH THE RELEVANT EMERGENCY PROCEDURE FOR "VAR NR" CAUTION LIGHT INDICATION.

a) Modes of operation

The system features the following modes of operation, which can be selected by a guarded mode selector switch on the center console:

NORM The primary mode for normal operation. In the NORM mode the system performs the torque sharing of both engines automatically, and the rotor speed will automatically be controlled in a range of min. 98% at high air density up to a maximum of 102% at low air density in forward flight (maximum 101% in hover). The N₁ adjust knob on center console is not active in this mode.

104% This mode is only operative at altitudes above 8000 ft and airspeeds below 55 KIAS and may be selected when maximum maneuverability and/or flight

EFFECTIVITY *Not for Helicopter S/N 7007*

4.5.3★ SPAS system check

- | | |
|--|--|
| Circuit breakers SPAS (2) and INV (1 or 2, as installed) | - Check in |
| INVERTER switch (1 or 2, as installed) | - ON |
| SPAS toggle switch | - ON, then TEST and release. |
| SPAS caution light | - Check for illumination <u>after</u> approximately 4 seconds. |
- If caution light fails to illuminate or if illumination occurs immediately after initiation of test procedure:
- | | |
|--------------------|---|
| SPAS toggle switch | - OFF/RESET - continue with SPAS switched OFF and note that V_{NE} is reduced by 15 kt. |
|--------------------|---|
- If test result positive:
- | | |
|--------------------|---|
| SPAS toggle switch | - OFF/RESET, then ON - check SPAS caution light extinguished. |
|--------------------|---|

4.5.4★ Avionic checks

- | | |
|-------------------------------------|-----------------|
| COMM/NAV equipment | - ON and check |
| All other instruments and equipment | - Check and set |

4.5.5★ Miscellaneous checks

- | | |
|-----------------------------|-------------------|
| Optional equipment switches | - Set as required |
|-----------------------------|-------------------|

4.5.6 Power check

Perform power check as required (see Section 5)

4.5.7 Bleed air heating check

- | | |
|-------------------|---|
| HTR SELECT switch | - BOTH |
| HTR switch | - ON - check if ENG 1 / ENG 2 HEAT control lights come on and TOT rises simultaneously. |
| HTR switch | - OFF - check if ENG 1 / ENG 2 HEAT control lights go off and TOT drops simultaneously. |

4.5.8★ Force trim release (FTR) function check (only applicable if the provisions for DAFCS installation incorporated)

- | | |
|--|---|
| Power levers | - Check in IDLE position. |
| FTR switch (pilot and copilot, respectively) | - Press while making small cyclic inputs in all four directions; check that no spring forces are present. |

4.5.9 VARTOMS – Variable rotorspeed and torque matching system

CAUTION IF ANY ABNORMAL FUNCTION OF THIS SYSTEM IS SUSPECTED, SELECT THE "MAN" MODE AND PROCEED IN ACCORDANCE WITH THE RELEVANT EMERGENCY PROCEDURE FOR "VAR NR" CAUTION LIGHT INDICATION.

a) Modes of operation

The system features the following modes of operation, which can be selected by a guarded mode selector switch on the center console:

NORM The primary mode for normal operation. In the NORM mode the system performs the torque sharing of both engines automatically, and the rotor speed will automatically be controlled in a range of min. 98% at high air density up to a maximum of 102% at low air density in forward flight (maximum 101% in hover). The N_1 adjust knob on center console is not active in this mode.

104% This mode is only operative at altitudes above 8000 ft and airspeeds below 55 KIAS and may be selected when maximum maneuverability and/or flight performance is required (e.g. during hover maneuvers, takeoff and landing at high altitudes under right hand side wind conditions, turbulence, etc.). Rotor speed control functions similarly to the NORM mode but rotor speed is 3% higher (max. 104%). When operating near the N_1 limit, maximum engine performance will be utilized by matching both engine gas producer speeds using the N_1 adjust knob. However, N_1 adjustment should always be performed in a situation where the rotor speed is lower than 104%. Since the power characteristics may slightly differ between the engines, the torque values will not necessarily match. Once adjusted, the N_1 adjust knob should not be moved again. Only long term changes in the engines power characteristics relative to each other may require a readjustment from time to time. When descending below 8000 ft or accelerating above 55 kt, the rotor speed will automatically be reduced by 3% while the N_1 adjust knob remains functioning. However, in this case it is recommended to switch back to the NORM mode.

MAN In the manual mode, the system is shut off and the rotor speed can be controlled by using the engine trim system (4-way beep switch on the collective).

b) ★ System check

NOTE For takeoff from an airfield of a high elevation (≥ 8000 ft) under right hand side wind conditions, turbulence etc. it is recommended to select the 104% mode.

- | | |
|------------------------------|-------------|
| 1. Desired mode of operation | – Select |
| 2. ENC ALT VAR NR sw | – ON |
| 3. VAR NR caution light | – Check OFF |

4.6 ★ PRE-TAKEOFF CHECK

- | | |
|-----------------------------------|--|
| 1. Power levers | - Move smoothly to FLY position |
| 2. Audio warning tone | - Check by reducing N_R/N_2 below 95%; ROTOR RPM warning and low rotor RPM <u>audio tone</u> must come on, then adjust N_R/N_2 back to 98% |
| 3. Cyclic stick | - Check centering device secured |
| 4. Engine and XMSN instruments | - In the green range |
| 5. Fuel quantity | - Recheck |
| 6. All caution and warning lights | - OFF |
| 7. Bleed air consumers | - OFF |
| 8. Optional equipment | - As required |
| 9. Collective pitch | - Unlock; check correct friction |

4.7 ★ TAKEOFF CHECK

- | | |
|-----------------------------------|-----------------------------------|
| 1. Hover flight | - Perform |
| 2. N_2 /Rotor RPM 98-102% | - Check (when NORM mode selected) |
| 3. Torque | - Check synchronized |
| 4. Hover power | - Check |
| 5. Engine and XMSN instruments | - Recheck |
| 6. All caution and warning lights | - OFF |

After takeoff:

- | | |
|------------------------|---------------|
| 7. Bleed air consumers | - As required |
|------------------------|---------------|

4.8 PRE-LANDING CHECK

NOTE For landing into an airfield of an elevation greater than 8000 ft under right hand side wind conditions, turbulence etc. it is recommended to operate the VARTOMS in the 104% mode.

- | | |
|-----------------------------------|-----------------------|
| 1. VARTOMS | - Select desired mode |
| 2. All instruments | - Check |
| 3. All caution and warning lights | - Check |
| 4. Bleed air consumers | - OFF |

★ To be checked **before each flight**

■ **EFFECTIVITY** *Not for Helicopter S/N 7007*

4.9 ENGINE SHUTDOWN

- NOTE**
- Check illumination of ROTOR RPM warning light plus continuous aural signal when the rotor RPM drop below 95%. If not fulfilled, entry in logbook and maintenance action are required.
 - Check illumination of ENG I LOW and ENG II LOW warning lights plus intermittent aural signal, when the N_1 RPM of the engines drop below 60%. If not fulfilled, entry in logbook and maintenance action are required.
 - Set clock for a minimum ground idle run of 30 seconds to allow the engines to cool down.

CAUTION AFTER SINGLE ENGINE LANDING, WHEN EITHER MAX. CONTINUOUS POWER OR 2.5 MINUTES POWER WAS APPLIED, A GROUND IDLE RUN OF AT LEAST 3 MINUTES IS REQUIRED BEFORE SHUTDOWN.

- | | |
|--------------------------|--|
| 1. Cyclic stick position | - Check |
| 2. Collective pitch | - Lock |
| 3. Power levers | - IDLE ($70\% \pm 2\% N_1$), start clock |
| 4. | - |
| 5. All consumers | - OFF except anti-collision light |
| 6. Power levers | - After 30 seconds at IDLE, OFF |

NOTE Check rundown time of gas producer. The time to decelerate from $N_1=30\%$ to $N_1=0\%$ should be approximately 40 seconds. If the time is less than 30 seconds or abnormal noises are heard, perform engine inspection (refer to TURBOMECA ARRIEL IE2 Maintenance Manual).

- | | |
|--------------------------|-----------------------|
| 7. TOT and N_1 drop | - Monitor |
| 8. FUEL PUMP XFER (2) | - OFF |
| 9. Generators | - OFF |
| 10. Rotor brake | - Apply below 50% RPM |
| 11. Anti-collision light | - OFF |
| 12. PWR SELECT switch | - OFF |

4.6 ★ PRE-TAKEOFF CHECK

- | | |
|-----------------------------------|--|
| 1. Power levers | - Move smoothly to FLY position |
| 2. Audio warning tone | - Check by reducing N_R/N_2 below 95%; ROTOR RPM warning and low rotor RPM <u>audio tone</u> must come on, then adjust N_R/N_2 back to 98% |
| 3. Cyclic stick | - Check centering device secured |
| 4. Engine and XMSN instruments | - In the green range |
| 5. Fuel quantity | - Recheck |
| 6. All caution and warning lights | - OFF |
| 7. Bleed air consumers | - OFF |
| 8. Optional equipment | - As required |
| 9. Collective pitch | - Unlock; check correct friction |

4.7 ★ TAKEOFF CHECK

- | | |
|-----------------------------------|-----------------------------------|
| 1. Hover flight | - Perform |
| 2. N_2 /Rotor RPM 98-102% | - Check (when NORM mode selected) |
| 3. Torque | - Check synchronized |
| 4. Hover power | - Check |
| 5. Engine and XMSN instruments | - Recheck |
| 6. All caution and warning lights | - OFF |

After takeoff:

- | | |
|------------------------|---------------|
| 7. Bleed air consumers | - As required |
|------------------------|---------------|

4.8 PRE-LANDING CHECK

NOTE For landing into an airfield of an elevation greater than 8000 ft under right hand side wind conditions, turbulence etc. it is recommended to operate the VARTOMS in the 104% mode.

- | | |
|-----------------------------------|-----------------------|
| 1. VARTOMS | - Select desired mode |
| 2. All instruments | - Check |
| 3. All caution and warning lights | - Check |
| 4. Bleed air consumers | - OFF |

★ To be checked **before each flight**

EFFECTIVITY Helicopter S/N 7007

4.9 ENGINE SHUTDOWN

- NOTE**
- Check illumination of ROTOR RPM warning light plus continuous aural signal when the rotor RPM drop below 95%. If not fulfilled, entry in logbook and maintenance action are required.
 - Check illumination of ENG I LOW and ENG II LOW warning lights plus intermittent aural signal, when the N_1 RPM of the engines drop below 60%. If not fulfilled, entry in logbook and maintenance action are required.
 - Set clock for a minimum ground idle run of 30 seconds to allow the engines to cool down.

CAUTION AFTER SINGLE ENGINE LANDING, WHEN EITHER MAX. CONTINUOUS POWER OR 2.5 MINUTES POWER WAS APPLIED, A GROUND IDLE RUN OF AT LEAST 3 MINUTES IS REQUIRED BEFORE SHUTDOWN.

- | | |
|--------------------------|--|
| 1. Cyclic stick position | - Check |
| 2. Collective pitch | - Lock |
| 3. Power levers | - IDLE ($70\% \pm 2\% N_1$), start clock |
| 4. | - |
| 5. All consumers | - OFF except anti-collision light |
| 6. Power levers | - After 30 seconds at IDLE, OFF |

NOTE Check rundown time of gas producer. The time to decelerate from $N_1=30\%$ to $N_1=0\%$ should be approximately 40 seconds. If the time is less than 30 seconds or abnormal noises are heard, perform engine inspection (refer to TURBOMECA ARRIEL IE2 Maintenance Manual).

- | | |
|--------------------------|-----------------------|
| 7. TOT and N_1 drop | - Monitor |
| 8. FUEL PUMP XFER (2) | - OFF |
| 9. Generators | - OFF |
| 10. Rotor brake | - Apply below 50% RPM |
| 11. Anti-collision light | - OFF |
| 12. PWR SELECT switch | - OFF |
| 13. MASTER PWR switch | - OFF |

4.10 FLIGHT CHARACTERISTICS

4.10.1 Flight Controls

CAUTION AVOID EXTREME CYCLIC STICK DISPLACEMENTS WHEN ON THE GROUND WITH ROTOR TURNING.

During ground operations with rotor turning, the cyclic stick must remain in the neutral position and the collective pitch lever in the full down position; however, for functional test purposes, minimum control movements (not more than 3 cm from neutral) are allowed.

Avoid extreme pedal movements during ground operations.

4.10.2 Lateral Control Characteristics

WARNING AVOID STEEP RIGHT TURNS AT AIRSPEEDS BELOW 70 KIAS CLOSE TO THE GROUND IN ORDER TO MAINTAIN SUFFICIENT LATERAL CONTROL MARGIN FOR RECOVERY.

Lateral control characteristics of single-rotor helicopters are significantly influenced by forward speed (airspeed), bank angles and relating g-loads.

During high load factor maneuvers at airspeeds below 70 KIAS the cyclic stick can reach the left lateral stop before retreating-blade stall entry.

Reduction of the load factor and/or nose-left side slip will improve left lateral control margin.

4.10.3 Maximum bank angles in turns

The following tables show the recommended maximum bank angles for right and left turns at various altitudes and airspeeds:

For altitudes up to 8000 ft:

INDICATED AIRSPEED	ANGLE OF BANK
0 kt - 30 kt	30°
30 kt - 60 kt	45°
60 kt - ($V_{NE}^* - 30$ kt)	60°
($V_{NE}^* - 30$ kt) - V_{NE}^*	30°

For altitudes above 8000 ft:

INDICATED AIRSPEED	ANGLE OF BANK
0 kt - 30 kt	30°
30 kt - ($V_{NE}^* - 30$ kt)	45°
($V_{NE}^* - 30$ kt) - V_{NE}^*	30°

* For V_{NE} values refer to the V_{NE} table in Section 2.

4.10.4 Maximum rate-of-descent during hover or low speed flight

Any descent during hover or low speed flight (up to 20 kt) should be performed with a descent rate of not more than 600 ft/min.